California Monthly Climate Summary
December 2009

Weather Highlights

December 2009 was a cold, drier than average month for California. According to the Western Region Climate Center's California Climate Tracker, the monthly average temperature was 40.2°F which is 1.6°F lower than the long-term average of 41.8°F. With a statewide average of 3.32 inches, precipitation for December was 85% of the long term average. Annual plots from the California Climate Tracker are included at the end of the summary.

December started out cool and dry over California with the exception of the far north coast and southern Cascades where light precipitation fell. The first weather systems of the month didn't move in until the second week of the month. Light to moderate precipitation fell mainly in Northern California and temperatures dropped to record lows in places with the cold air. The cold air remained in place until a warmer Pacific storm came ashore bringing widespread precipitation with it. Snowfall in the Sierra Nevada exceeded 2 feet in places. However, it was Central and Southern California that received the bulk of the rainfall from this event. The third week of the month saw high pressure build in over the state leading to foggy conditions in the Central Valley. Southern California enjoyed unseasonably warm dry weather during this period. These conditions persisted into the fourth week of the month until a couple of Pacific storm systems came ashore bringing rain mostly to Northern California. The month closed out with more storm systems crossing the state bringing light precipitation to some locations.

Preliminary records, reported on the National Weather Service Record Event Report, shows that statewide there were 44 temperature records tied or broken and 23 precipitation record tied or broken for the month. For the year 2009, there were 1015 temperature records and 107 precipitation records set or tied. Of the 44 temperature records set in December, 34 were for new low minimum temperatures. Records were set over 11 days of the month. For the year 2009, 168 days were record setters. For December, some long-standing records were tied or broken. Livermore tied a 1906 record on 12/6 with a low temperature reading of 26°F. Red Bluff and Marysville/Yuba City set new low temperature records on the 6th with readings of 23°F and 25°F respectively. The old records were 27°F set in 1937 for Red Bluff and 28°F set in 1936 in Marysville/Yuba City. On December 7th, Eureka recorded its first trace of snowfall for that day. On December 9th Redding set a new all time low temperature record with a reading of 16°F. The previous all-time low temperature was 17°F set in 1/20/1937 and tied on 12/21/1990. Redding followed this up with a new low temperature record on the 10th with a reading of 19°F which broke the old record of 20°F set back in 1932. Red Bluff tied its 1932 low temperature record with a reading of 20°F on the 10th. On December 12th, Fresno broke a precipitation record set back in 1906 with 0.47 inches. The old record was 0.38 inches. On December 19th Laguna Beach recorded a low temperature of 64°F which broke the old high minimum temperature record of 61°F set back in 1934. On the

same day Indio recorded a 57°F minimum temperature which broke the old high minimum temperature of 55°F set back in 1938. For the year, XX temperature records were tied or set and XX precipitation records were tied or set. Plots at the end of the summary show the monthly breakdown.

For the California Data Exchange Center's (CDEC) network of temperature gages used in this report, 250 stations recorded a minimum temperature below freezing in December while no stations reached or exceeded 100°F at least once during the month. Statewide extremes from the CDEC network of temperature gages are shown below. Also shown are the monthly average extremes from the CIMIS network. A table of regional average minimum, mean, and maximum temperatures from the CDEC and CIMIS networks is also shown at the end of the summary.

Precipitation in December ranged from below normal in the north part of the state to well above average in the south part of the state. For the CDEC precipitation gages for December 2009, the largest amount of precipitation recorded was Lodgepole in the Tulare Lake region with 10.23 inches. This is 129% of the average precipitation for this station for December. At the other end of the spectrum, Death Valley recorded 0.04 inches of precipitation for the month. This is 18% of the average precipitation for this station for December. For the CIMIS network, Lake Arrowhead in San Bernardino County topped the precipitation charts with 5.60 inches for the month and 12 stations recorded no precipitation. Some CIMIS gages may show large precipitation totals if the gages are not covered during irrigation activities so care should be given to review precipitation data used from this network. This is normally not an issue in the winter. The 8-Station Index for northern California precipitation recorded 6.8 inches in December with 21 days showing precipitation. On average, 9 inches of precipitation is recorded for the 8-Station index in December. Statewide, the average precipitation for December was 85% of the long-term average based on the California Data Exchange Center (CDEC) gages. Precipitation percentages by region from the CDEC gages are shown in a table at the end of this document.

CoCoRaHS Update

December 2009 continues California's second year with CoCoRaHS – the Community Collaborative Rain, Hail and Snow Network. This group uses citizen volunteers to record rain, hail and snow data. The users enter the data online at the CoCoRaHS web site. The web site provides the opportunity to see spatial detail of rain and snow patterns in participating states. After one year in the program California has 590 volunteers signed up spanning 50 of California's 58 counties. The county with the most volunteers at the end of December is Sonoma with 82 volunteers. For the month of December 8,647 reports were recorded for California. The largest daily rain total for CoCoRaHS- CA in December was in Humboldt County with 4.2 inches recorded on 12/16/09. Four hail reports were submitted in December with one in Sonoma County, one in Mariposa County, one in Mendocino County, and one in Shasta County. Reports were for 0.25 inch (pea size) hail or smaller. One hundred thirty-three snow reports were included with the precipitation reports with a 32 inch depth being the largest new snow total from Placer County on the 7th. The largest total snow depth

reported was 58 inches in Placer County on the 14th. To join CoCoRaHS or find more information, please visit http://www.cocorahs.org.

Snowpack and Water Supply Conditions

October kicked off water year 2010 for the water supply index categories. Water year 2009 resulted in a dry category for the Sacramento Basin and below normal for the San Joaquin Basin. The first water supply index forecast for 2010 will be made in January. Water supply information for California can be found at http://cdec.water.ca.gov/water_supply.html. A historical listing of water year categories for both basins can be found at http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST.

Drought Monitor and Seasonal Outlook

December's rains brought about a mix of improvement and degradation in California's drought as depicted in the Drought Monitor. The maps for California for December 1, 2009 and December 29, 2009 are shown below. The Drought Monitor maps can be found on the National Drought Mitigation Center's (NDMC) website http://drought.unl.edu/dm/. These maps are largely a reflection of precipitation and soil moisture deficit estimates. As of the December 29th depiction, the entire state of California is depicted in either D0 (abnormally dry), D1 (moderate drought) conditions, or D2 (severe drought) conditions with the exception of the central Sierra region which is considered drought free. The D2 category lost area in the south and gained area in the north. Changes in areas in D0 or D1 were also observed. Drought free area in California was 6.6% for the depiction on the 29th. Maps are updated weekly.

The U.S. Seasonal Drought Outlook for January through March from NOAA depicts California with improving conditions across the state with the exception of the northernmost part of the state which is forecast to have only some improvement. This forecast is based on climatology and an expectation for a wetter than average winter largely due to the evolving El Niño conditions in the tropical Pacific. Updates are provided twice per month. Maps and information can be found at http://www.cpc.noaa.gov/products/expert_assessment/seasonal_drought.html.

The California Nevada River Forecast Center has begun producing some drought monitoring tools for California. These tools look at the frequency associated with precipitation deficits for the Northern California Eight Station Index and the San Joaquin Five Station Index. Another tool looks at the frequency of end-of-month storage for select reservoirs in California. The frequencies of the observations are related to the Drought Monitor's drought categories D0 through D4. These tools can be found at http://www.cnrfc.noaa.gov/climate.php. For December, the Eight Station Index is in drought free conditions for a 12-month period and D0 for the 24 month period. The Five Station Index is drought free for both periods. For the reservoirs for end-of-December storage, Oroville is at a D3 storage, Trinity reservoirs is at a D2 level while Shasta, Berryessa, Folsom, Lake Tahoe, Friant, Nacimiento/ SanAntonio, and Casitas are at a D1 level. Lake Isabella and San Luis at a D0 level and all other reservoirs on the graphic are considered to be drought-free.

ENSO Conditions and Long-Range Outlooks

The El Niño/Southern Oscillation (ENSO) is being classified as an El Niño pattern. Equatorial sea surface temperature anomalies for the tropical Pacific for October have been positive with values of 1.9°C in the Niño 3.4 at the end of December. The October through December 3-month running mean of the Ocean Niño Index (ONI) is 1.5 which is the sixth ONI value above the threshold to qualify for an El Niño event. Five consecutive ONI values need to be above the threshold value of 0.5 for conditions to be classified as an El Nino event. Most forecast models have the tropical sea surface temperatures remaining in El Niño conditions through the early part of 2010. More information can be found at the Climate Prediction Center's web site: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ Updates are posted weekly. The latest three month outlook (January through March) from NOAA indicates equal chances for above or below normal temperatures for the entire state of California with the exception of the northeast corner of the state which is forecast to have above normal temperatures. For precipitation, the entire state is forecast to have above normal conditions with a stronger signal in the south. Outlook plots and discussions can be fount at http://www.wrcc.dri.edu/longrang/. General weather information of interest can be found at http://www.noaawatch.gov/. For anomaly information please see http://www.wrcc.dri.edu/anom/cal_anom.html.

Agricultural Data

Ground preparations started for field crops that will be planted in 2010. Early dryland forage crops were stressed by lack of water in Tulare County. Wheat, oats, and barley were planted in places during the month. Central Valley citrus crops were picked as were lemon crops from the desert regions of the state. Frost prevention measures were employed during the month to limit damage from the record cold weather that hit the state. Some frost damage to the olive crop in the San Joaquin Valley was reported. Post harvest pruning and maintenance was carried out in orchards as well. Ground preparations for next year's vegetable crops also occurred in December. Kern County harvested carrots while chili peppers for processing were picked in Merced County. Many vegetables were harvested in Fresno County. Rains and favorable temperatures helped range and pasture conditions in the central and southern parts of the state. More precipitation will be needed however to continue to support the new growth on relatively poor grazing lands. Supplemental feeding continued in places. The cooler temperatures increased milk production. For further crop information see http://www.nass.usda.gov/index.asp.

Other Climate Summaries

California Climate Tracker (new product of Western Region Climate Center)
Golden Gate Weather Service Climate Summary
NOAA Monthly State of the Climate Report

Statewide Extremes (CDEC)
High Temperature – 82°F (Las Flores Camp Pendleton, South Coast)
Low Temperature – 22°F (Casa Vieja Meadows, Tulare)
High Precipitation – 10.23 inches (Lodgepole, Tulare)
Low Precipitation – 0 inches (12 Stations)

Statewide Extremes (CIMIS)
High Average Maximum Temperature – 70^0F (Westmorland North, Imperial County)
Low Average Minimum Temperature – 13^0F (Alturas, Modoc County)
High Precipitation – 5.60 inches (Lake Arrowhead, San Bernardino County)*
Low Precipitation – 0 inches (12 stations)
*Sometimes irrigation water from sprinklers gets counted as precipitation if the gage is not covered.

Statewide Precipitation Statistics

Hydrologic Region	Region Weight	Basin Reporting			Stations Reporting			% of Historic Average	
		Basins	Dec	Oct-Dec	Stations	Dec	Oct-Dec	Dec	Oct-Dec
North Coast	0.27	5	5	5	17	10	9	52.2%	66%
SF Bay	0.03	3	3	3	6	5	4	68.4%	101%
Central Coast	0.06	5	4	4	10	5	5	96.3%	119%
South Coast	0.06	5	5	5	15	12	10	132.3%	100%
Sacramento River	0.26	10	9	9	43	32	31	72.3%	75%
San Joaquin River	0.12	8	7	7	27	22	22	108.2%	98%
Tulare Lake	0.07	5	5	5	27	23	22	144.8%	114%
North Lahontan	0.04	6	5	5	14	9	7	92.2%	80%
South Lahontan	0.06	5	5	5	14	10	9	80.3%	73%
Colorado River	0.03	2	2	2	6	3	3	169.2%	98%
Statewide Weighted Average	1	54	50	50	179	131	122	85.4%	83.75%

Statewide Mean Temperature Data by Hydrologic Region (degrees F)

Hydrologic Region	No. Stations	Minimum	Average	Maximum
North Coast	28	18.9	37.6	57.8
SF Bay	18	31.0	44.5	59.4
Central Coast	37	35.4	48.5	64.6
South Coast	56	32.4	49.5	70.4
Sacramento	92	14.8	37.0	59.5
San Joaquin	75	18.7	38.0	57.4
Tulare Lake	19	5.0	30.4	55.6
North Lahontan	31	-1.2	26.2	49.5
South Lahontan	18	14.2	33.3	54.9
Colorado River Desert	22	36.1	51.2	68.7
Statewide Weighted Average	396	18.4	38.3	59.1

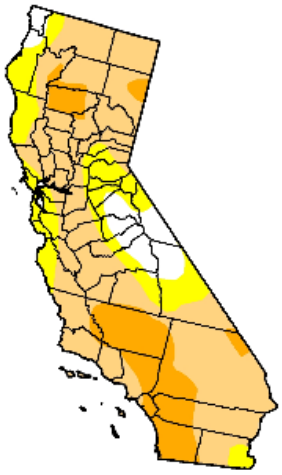
U.S. Drought Monitor

California

December 1, 2009
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	7.7	92.3	74.0	17.3	0.0	0.0
Last Week (11/24/2009 map)	8.4	91.6	73.6	17.3	0.0	0.0
3 Months Ago (09/08/2009 map)	0.0	100.0	73.4	45.8	0.0	0.0
Start of Calendar Year (01/06/2009 map)	1.7	98.3	88.2	41.3	2.8	0.0
Start of Water Year (10/06/2009 map)	0.0	100.0	73.4	45.8	0.0	0.0
One Year Ago (12/02/2008 map)	0.0	100.0	86.0	41.3	0.0	0.0



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

http://drought.unl.edu/dm

Released Thursday, December 3, 2009
Author: Anthony Artusa, CPC/NOAA

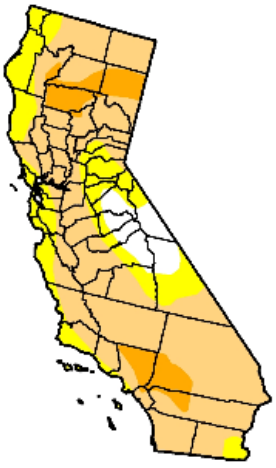
U.S. Drought Monitor

California

December 29, 2009
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	6.6	93.4	72.2	9.2	0.0	0.0
Last Week (12/22/2009 map)	6.6	93.4	72.2	9.2	0.0	0.0
3 Months Ago (10/06/2009 map)	0.0	100.0	73.4	45.8	0.0	0.0
Start of Calendar Year (01/06/2009 map)	1.7	98.3	88.2	41.3	2.8	0.0
Start of Water Year (10/06/2009 map)	0.0	100.0	73.4	45.8	0.0	0.0
One Year Ago (12/30/2008 map)	1.7	98.3	88.2	43.0	2.8	0.0



Intensity:

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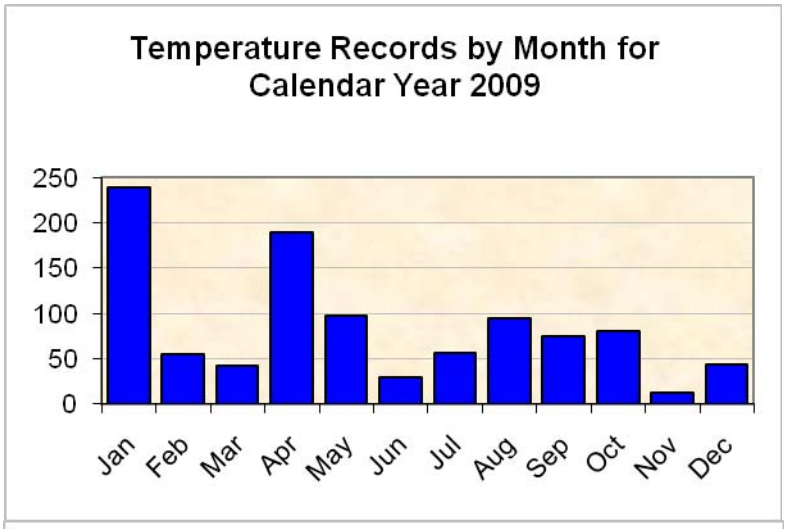
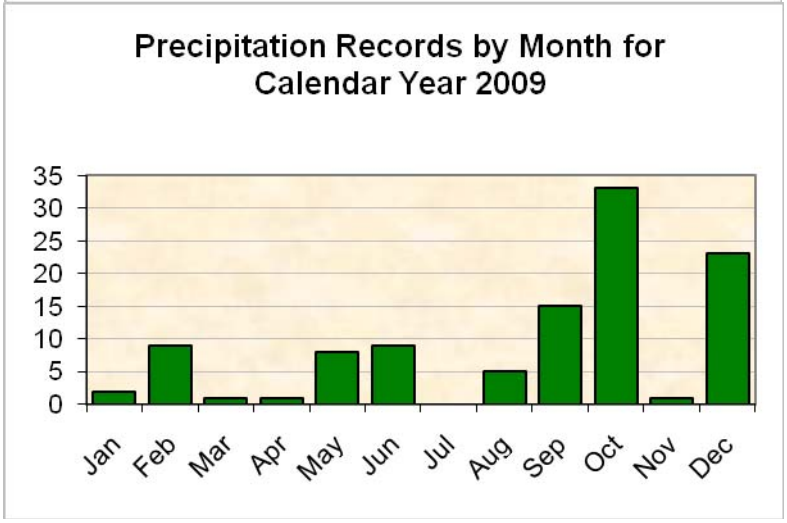
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

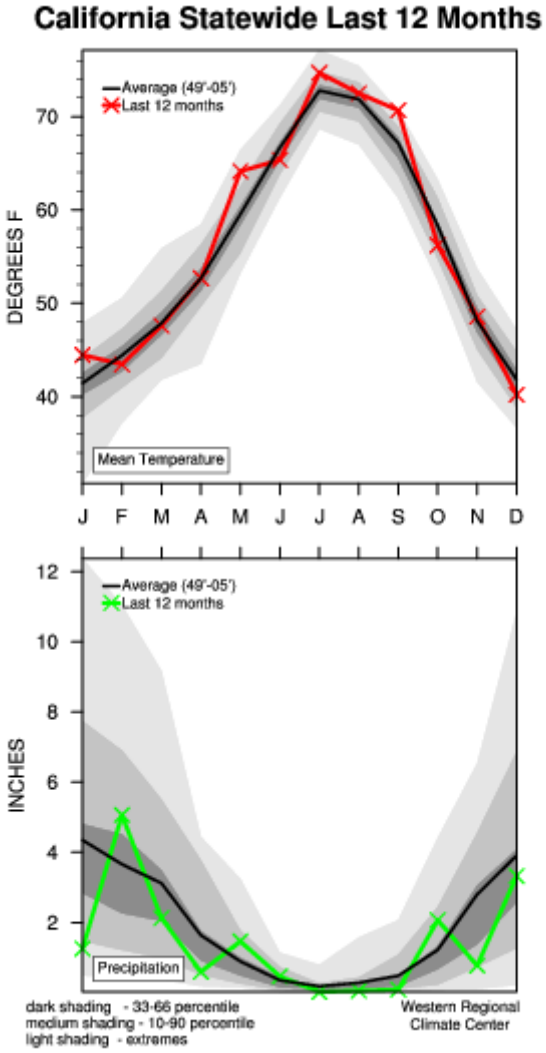
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements

http://drought.unl.edu/dm

Released Thursday, December 31, 2009
Author: Richard Heim, NOAA/NESDIS/NCDC


Temperature Records by Month for Calendar Year 2009
250
200
150
100
50
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Precipitation Records by Month for Calendar Year 2009
35
30
25
20
15
10
5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


California Statewide Last 12 Months
Average (49'-05')
Last 12 months
DEGREES F
70
60
50
40
Mean Temperature
J F M A M J J A S O N D
Average (49'-05')
Last 12 months
INCHES
12
10
8
6
4
2
Precipitation
dark shading - 33-66 percentile
medium shading - 10-90 percentile
light shading - extremes
Western Regional
Climate Center